

Multi-Directional Composite Cylinders Assemblage Module for Physics-Based CMC Durability Modeling, Phase I

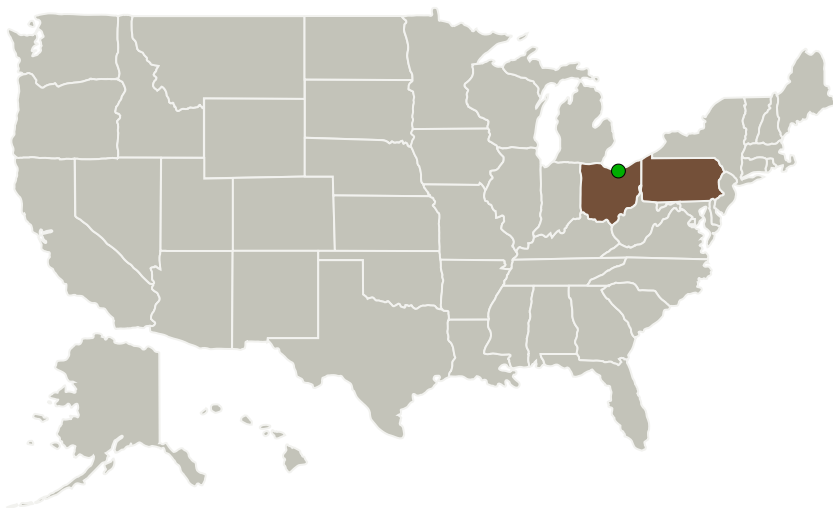
Completed Technology Project (2010 - 2010)



Project Introduction

Compared to superalloys, ceramic matrix composites (CMCs) offer reduced weight and superior specific properties at elevated temperatures. However, CMCs are prone to oxidation degradation when exposed to oxygen at high temperatures, which is the primary driver for useful life of the component. Accurate predictions of CMC life require accurate predictions of oxidation behavior, which require accurate values of the material properties that control the oxidation process. One of these key properties is permeability. In this effort, MR&D proposes to gather test data, then appropriately modify, correlate, and integrate a Multidirectional Composite Cylinders Assemblage (CCAMD) model with its current ABAQUS oxidation model. This will allow permeability to be calculated and updated continuously during an oxidation analysis as dictated by external loads, significantly enhancing the accuracy of current durability models.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Materials Research and Design, Inc.	Lead Organization	Industry	Wayne, Pennsylvania
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio



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Primary U.S. Work Locations

Ohio

Pennsylvania

Project Transitions



January 2010: Project Start



July 2010: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139254>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Materials Research and Design, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

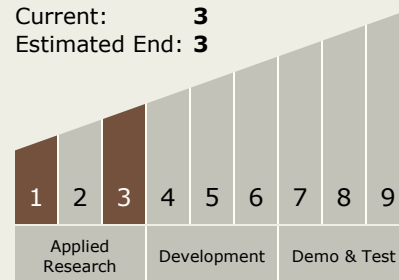
Brian J Sullivan

Technology Maturity (TRL)

Start: **1**

Current: **3**

Estimated End: **3**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.2 Computational Materials

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System